RIVERS AND FLOODS

By RICHMOND T. ZOCH

[River and Flood Division, Montrose W. Hayes, in charge]

Three minor floods occurred in the United States during October, as shown in the accompanying table. No damage was caused by the overflows in the Santee and Rio Grande and only slight damage by that in the Sulphur.

Table of flood stages in October 1933

[All dates are in October]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE	*Feet*			*Feet*	
Santee: Rimini, S.C.	12	4	9	13.5	6
		12	14	12.4	14

Table of flood stages in October, 1933—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM					
Red Basin					
Sulphur: Ringo Crossing, Tex.	20	16	17	23.2	17
WEST GULF OF MEXICO DRAINAGE					
Rio Grande:					
Mercedes, Tex.	20	4	8	21.2	6–7
		17	17	20.1	17
Brownsville, Tex.	18	5	8	18.2	5–8

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDonald, in charge]

NORTH ATLANTIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—Pressure, as a rule, averaged from normal to slightly below in middle and lower latitudes of the North Atlantic during October 1933, as indicated by table 1, with the point of greatest departure, −0.13 inch, occurring at Horta, Azores. As frequently happens, during months of depression of the Atlantic anticyclone, the Icelandic LOW became less intense, with the consequence that the gradient existing between the two areas, in terms of average monthly extremes of pressure, was comparatively small. This month the average pressure at Reykjavik, Iceland, was 0.13 inch above normal, and the average difference in pressure between Reykjavik and Horta was only 0.17 inch. In October 1932 the corresponding difference was 0.67 inch. The highest corrected barometer reading from a ship at sea during October 1933 was 30.54 inches, occurring on the 22d, near 41° N., 67° W., and on the 28th, near 51° N., 31° W. The lowest corrected reading was 28.49 inches, occurring on the 7th, in 42°17′ N., 65°56′ W. A reading of 28.30 inches, but uncorrected, was made on the 6th, in 29°50′ N., 74°50′ W. Both low readings were in connection with the hurricane of October 1–9.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, October 1933*

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.90		30.48	25	29.32	16
Reykjavik, Iceland	29.81	+0.13	30.72	25	28.99	13
Lerwick, Shetland Islands	29.82	+.03	30.44	2	28.86	11
Valencia, Ireland	29.95	+.04	30.48	26	29.25	9
Lisbon, Portugal	30.01	−.01	30.23	30	29.62	22
Madeira	29.95	−.04	30.17	13	29.68	27
Horta, Azores	29.98	−.13	30.32	20	29.63	26
Halifax, Nova Scotia	30.04	.00	30.52	22	28.88	8
Nantucket	30.07	+.02	30.61	21	29.38	7
Hatteras	30.06	.00	30.44	21	29.66	6
Bermuda	30.00	−.07	30.28	20, 21	29.54	7
Turks Island	29.88	−.07	30.02	20	29.72	5
Key West	29.87	−.07	30.08	20	29.09	5
New Orleans	30.02	−.01	30.26	10	29.76	5
Cape Gracias, Nicaragua	29.81	−.01	29.98	12	29.62	2

NOTE.—All data based on a.m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Extratropical cyclones and gales.—The northern steamer routes during the first 7 days of October were practically free of extratropical cyclones, and no gales were reported from this source during the entire period. On the 8th, however, cyclonic conditions overspread the entire northern part of the eastern half of the ocean, and by the 9th and 10th gales of force 8–9 were reported between the 35th meridian and the British Isles, and scattered gales of force 8 between the Azores and the coasts of Spain and France. On the 11th and 12th the principal gale field, with forces of 8, lay north of 50° N. and west of 40° W.

From the 12th to 22d anticyclones largely dominated most extratropical waters south of the 50th parallel, except for moderate intrusions from cyclones centered far to the northward. The principal storm period within these dates was that of the 14th to 17th, during which gales of force 8–10 were reported from near the 55th parallel, between 25° and 45° W.

From about the 18th to 23d a moderate cyclone hovered about the Iberian Peninsula and caused fresh gales (force 8) in the vicinity on the 21st to 23d.

On October 22 a cyclone center gathered near 50° N., 35° W. Owing to interposing high pressure north and east, it was forced to retrograde slowly into lower latitudes until the 27th, when it lay a short distance south of the Azores, afterward spreading in area and disintegrating. Local gales of force 8–9 attended its movements from the 24th to 26th, with the maximum force occurring on the 24th, in 46° N., 37° W. The lowest pressure indicated was 29.42 inches, also on the 24th.

The weather at the close of the month was unsettled over most of the ocean, but with no storm conditions of severity prevailing.

Tropical cyclones.—During the last few days of September 1933 unsettled conditions overspread the lower waters of the Caribbean Sea, where they continued until October 1. On that date a shallow cyclone center was definitely established with a northward movement. During the 2d and 3d the depression advanced almost due north midway between Jamaica and Swan Island. On the morning of the 3d a south gale of force 8 was reported at Negril Point, barometer 29.56 inches, and off the north coast of Cuba, immediately west of Habana, a northeast gale of force 9 was blowing. By night of the 3d the storm

center was close to the Cuban south coast, with the wind at Habana blowing a gale of force 9 from northeast, lowest pressure 29.34, noted at Cienfuegos.

During October 4 (see chart VIII) the center of the storm, now of full hurricane force, crossed Habana between 10 a.m. and noon. During a part of this time the calm was absolute. It was preceded and followed by hurricane velocities. The lowest pressure at Habana, 28.81 inches, occurred near 2 p.m., which was at least 2 or 3 hours later than the occurrence of the lull. This points to an erratic movement of the hurricane center during the period of its recurve toward the northeast. While there was some shipping in the Florida Straits on the 4th, the highest wind force noted at sea was 10, apparently late in the day, in 23°28′ N., 83°12′ W.

On the morning of the 5th the hurricane center lay near the southeast coast of Florida (Miami: wind northeast, force 7; barometer 29.14). At 8 a.m. the American S.S. *Empire Arrow*, Baltimore to Beaumont, reported a corrected pressure reading of 28.53 inches in 25°03′ N., 79°30′ W., indicating the storm to be deepening. Shortly afterward the wind experienced by the ship rose to force 12 from the west. At 7 p.m. of the 5th the storm center was north of the Bahamas, with a whole southeast gale blowing off Great Abaco Island. Near midnight the British S.S. *Humber Arm* reported a northwest gale, force 11, near 28° N., 75° W.

On the morning of the 6th (see chart IX) the storm center was near 29° N., 73° W. At 2 a.m. the American S.S. *Harold Walker* reported a southwest hurricane in 27°12′ N., 74°26′ W., and about an hour later the American S.S. *Heffron* reported a northeast hurricane with uncorrected pressure at 28.30 inches, approximately in 29°50′ N., 74°50′ W. During the morning strong gales to hurricane velocities covered most of the sea between 25°–30° N., and 70°–75° W. At 7 p.m. of the 6th the storm center was west of Bermuda, with a southeast gale of force 9 blowing at the island. Shipping apparently had avoided the thickest of the storm at this time and the maximum reported wind force during the p.m. hours was that of a whole gale (F. 10), near 33° N., 69° W., barometer 28.96 inches.

During the 7th the storm continued intense as it progressed from a position northwest of Bermuda to Nova Scotian waters. A wireless message picked up from the Italian S.S. *Montello* conveyed the information that the Greek S.S. *Annoula* sank at 1:30 a.m. of the 7th in about 34°30′ N., 66°40′ W., and asked that ships keep a lookout for 21 persons missing. The lost ship at the time was within the radius of the storm. A radiogram from Bermuda said that the British S.S. *Lady Nelson* passed through the calm center of the storm, barometer 28.68 inches. This was near 37½° N., 67° W. From midnight of this date until early morning of the 8th the German S.S. *Stuttgart*, in and near 42°17′ N., 65°56′ W., reported a low barometer reading of 28.49 inches and a wind of force 11 from east then west, which sufficiently indicates the virility of the hurricane at this time.

During the morning of the 8th the storm field lay principally south of Nova Scotia, with a pressure of 28.88 inches reported at Halifax, and fresh to strong gales in the vicinity. Gales continued during the day, but of lessening force, as the storm, rapidly decreasing in depth and area, swung east-northeastward south of Newfoundland and on the 9th entered the western edge of a great cyclone system then central west of the British Isles.

The succeeding tropical disturbance was of much less intensity. It originated east of the Bahama Islands on the 25th or 26th, and acquired some energy on the 27th, while central at some distance off the Carolina coasts, with south gales of force 9, pressure 29.32 inches, in 31°32′ N., 72°–73° W., at 7 a.m. Late in the afternoon the American S.S. *Coamo*, near 34° N., 72½° W., reported a whole gale (force 10) from the East, in connection with the disturbance. During the 28th the cyclone moved with great rapidity toward Nova Scotia, and near midnight had acquired greatest depth, as gathered from the report of the Dutch S.S. *Volendam*, which had a pressure of 28.80 inches, in 42°48′ N., 64°06′ W., followed in the early morning of the 9th by the maximum wind force (11, NNW.) shown in the history of the disturbance. During the 29th and 30th the remnant of the storm succeeded in wedging its way into the Gulf of St. Lawrence, between two banks of high pressure, and escaping into Labrador.

On the 31st of the month a further depression of the Tropics was central over the Windward Passage, lowest pressure reported, 29.58 inches. At or near 8 a.m. of this date the American S.S. *Gulfhawk* experienced a maximum wind force of 9 from east-northeast, in 23°42′ N., 74°42′ W. The depression originated in the southwestern Caribbean about October 27, and early in November was still of slight intensity.

North Atlantic aviation.—During the flights of the *Graf Zeppelin* this month, the ship set a record of 71 hours for a return trip from Rio de Janeiro to Fredrichshafen, where she arrived on the 10th. On this date the ship was undoubtedly assisted by the strong southerly winds then blowing over the northeastern Atlantic. In a later flight from the United States she left land at Cape May, N.J., on a return trip to Europe, succeeded in dodging the high winds occasioned by the disturbance in the western Atlantic on the 30th, but was delayed by unfavorable winds on the 31st. Charts X and XI show weather conditions over the North Atlantic during these two dates.

Fog.—The region of most frequent fog this month was that lying between Newfoundland and the Grand Banks and about 45° W., with 20 to 30 percent days of occurrence. East of the 45th meridian, the greater part of the transatlantic fog was observed between 50° and 55° N., with 1 to 6 days of occurrence, diminishing eastward. It was noted on 2 days off the coast of France, on 3 days in New England waters, and on 1 day each northeast of Hatteras and in the west-central Gulf of Mexico.